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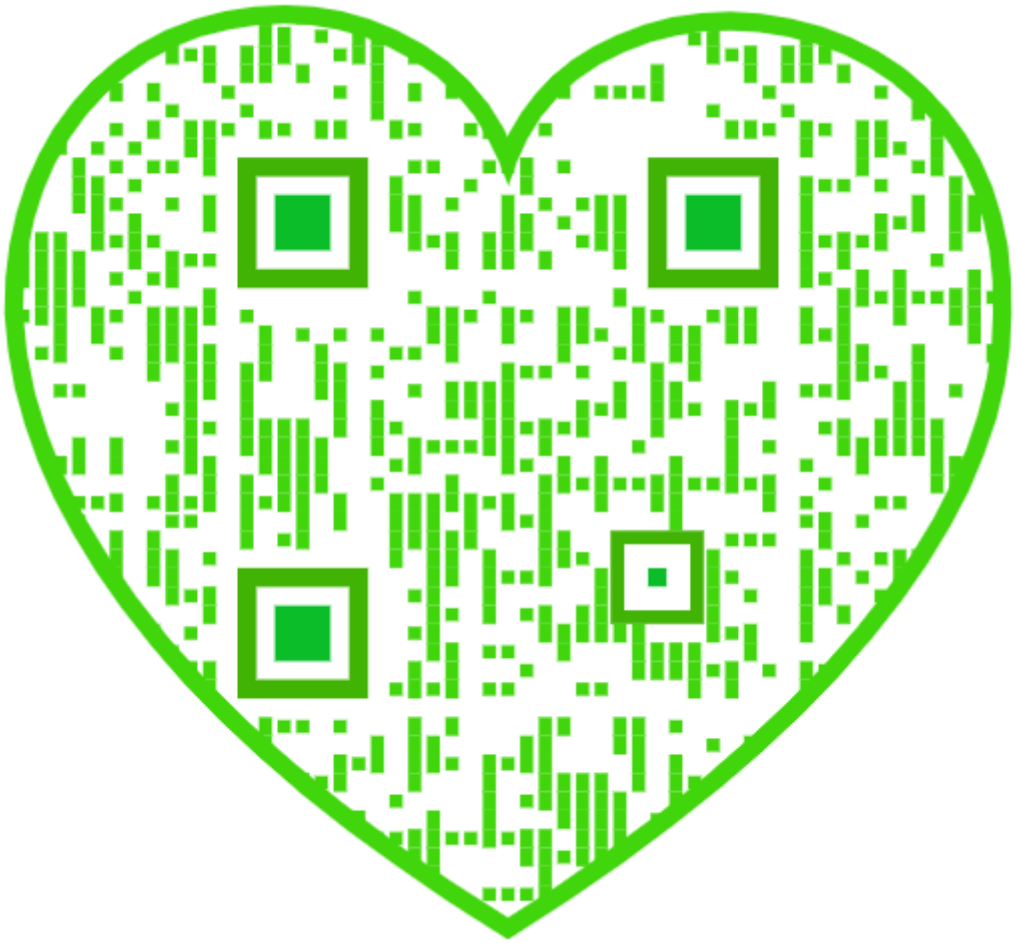

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TRANSPLANTATION OF TEETH

INTO

ARTIFICIAL SOCKETS

BY

WM. J. YOUNGER, M. D.

Ex-President of the California State Dental Association.
Ex-President San Francisco Dental Association.
SAN FRANCISCO, CAL.

REPRINT FROM
"Pacific Medical and Surgical Journal and Western Lancet"
JANUARY, 1886.
WITH ADDENDA.

With Compliments of the Author.

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TRANSPLANTATION OF TEETH

INTO

ARTIFICIAL SOCKETS.

Transplantation of teeth from one mouth to another is not, by any means, a new operation, as it was done many years ago for the noble and the opulent of the old world. It is not only mentioned in some of the very old works on surgery, but even by writers of fiction. Not only did the poor mar their mouths to sell their teeth, but even the freshly dead were disfigured for this purpose. Victor Hugo, himself, utilizes a knowledge of this operation in "Les Miserables," and makes one of his heroines, Fanchon, sell two of her front teeth in order to procure food for her starving child. But so many disastrous consequences occurred, so many painful effects followed, and so many failures happened, that the operation fell into disrepute and was abandoned as soon as artificial substitutes were invented that approached, in some measure, a natural appearance and in some degree served the purpose of mastication.

Not until I was in Paris in 1877, however, did I learn how the operation of transplantation was effected, and in learning that, I acquired an insight into the causes of the many disastrous, painful and futile results.

I will let Dr. Thomas W. Evans, the famous dentist of the Empire, and intimate friend of Napoleon III, explain, in his own language — during a conversation on professional topics — as nearly as I can recollect it, the *modus operandi* of transplantation, and the reason of his abandonment of it, as it was the narration of this incident in his practice that revealed to me the method pursued in transplanting teeth, and awoke the suggestions in my mind, that have made this operation, in my hands, the reverse of what it has been. But I wish it to be distinctly understood, that in whatever strictures I may make on the operation as illustrated in the case related by Dr. Evans, I do not, in the least, intend to reflect on him, for I have the highest esteem and respect for the professional skill and attainments, erudition and private worth that have gained for this distinguished gentleman, a social position that has contributed immensely in elevating the status of dental professional life abroad. Dr. Evans simply followed the beaten path, and was therefore not responsible for it. But to return to the subject.

"The last operation of this kind that I ever attempted," said he, "was that on a certain Marquise, who shall be nameless in consequence of the unfortunate results that followed the operation. She was a young, rich and lovely woman, but whose beauty was marred by the presence of four dead, black, badly decayed front teeth, which were a constant source of mortification to her. She had such an aversion to wearing false teeth that she would not consent to an artificial substitute; so the operation of transplantation was decided on. One of her maids was thereupon commissioned to search among her friends and acquaintances for a woman whose teeth would in size, contour and color suit the requirements of the case. At last one was found whose teeth seemed in every way suitable, and the consideration for them agreed upon. As it was not desirable that the parties

should know or afterwards recognize one another, the utmost secresy had been preserved, and was carried out to the end, in this wise: Two chairs were placed back to back. The Marquise, heavily veiled, was seated in one, and the woman, also heavily veiled, was then brought in and placed in the other. The lady's teeth were then drawn and laid aside, and then the woman's, which were immediately fitted into the gaping sockets of the Marquise's, and tied in by ligatures to the adjoining teeth. The woman was then led out, paid, and all further interest in her, I supposed, ended. Not so, however, for, as it afterwards transpired, this woman had been leading an immoral life, had contracted a loathsome disease, which was, unfortunately, communicated to the Marquise, and produced in her great anguish of mind and body, and the subsequent loss of the teeth. I came in for a share in the blame, for not having sufficiently examined the woman as to her health and moral status. I then determined never to perform the operation of transplantation again; it was fraught with too much danger."

This then was the method practiced in transplantation. The subjects were brought together, the fresh, blood covered teeth of one, with whatever of tartar and filth had accumulated on them, were immediately transferred, into the raw, bleeding and clotted sockets of the other; each tooth having in its body a mass of soft tissue, known as the pulp, whose life was extinguished as soon as rupture of its tissues occurred at the apex of the root; and which, being deprived of vitality, was bound to decompose with all the attendant phenomena of putrefaction, to wit: formation of gases, pus, etc. With this style of procedure, the wonder to me is, that the operation was ever successful.

In the first place, the danger of communicating hereditary or acquired disease, when the blood of one person is placed in contact with a raw surface of another must be evident to all.

Secondly. No thought seems to have been given as to how the tooth attached itself. It seems to have been put in in a haphazard sort of way, with an indefinite idea that it would grow into the gum. Now, it is due to the pericementum of the tooth, which is the analogue of the periosteum of the bones, that attachment to the walls of the socket is possible. And it is readily seen, that some of the clot into which the tooth is thrust, must remain between the root and the socket, preventing that intimate contact between the pericementum and the alveolar wall so requisite for union, to say nothing of the septic dangers attendant upon a decomposing, confined clot. But, supposing this difficulty and danger to be overcome, and sufficient union effected, we come to

Thirdly. The pulp or nerve, as it is called by the laity, is the substance, the death of which, produces that frightful torture attendant on the formation of what is known as alveolar abscess. The pulp then in these transplanted teeth,—being devitalized by the solution of continuity effected in extraction, and being unlike the pericementum in its power to retain vitality,—dies, and in its death, unless the tooth is secured by ligatures or otherwise, and the gases evolved are not sufficient, consequently, to expel it, all the painful train of phenomena attendant on the formation of alveolar abscess are sure to follow.

Fourthly. If, in spite of all these deterring causes, the tooth should become fixed in its new habitation, the decomposed pulp is partly absorbed by the tubuli of the dentine and the tooth becomes blackened and unsightly.

With the operation performed in *this* manner, we cannot but agree with other writers on the subject, that transplantation of teeth is accompanied with great danger and is bound to be a failure.

But *transplantation can be made a success and void of all danger*

and unpleasant consequences, if only common sense, and cleanliness, ordinary skill and care are taken.

It is to prove this and unprejudice the scientific mind, and, through it, the public, and to do away with the abomination of false teeth, that I here present to the profession the results of my experiments and experience in this direction.

I gained courage to try the operation by reflecting on the experiment of John Hunter, who, to test the vitality of the pericementum, planted a tooth in a cock's comb. This tooth attached itself firmly to the crest, and a few months afterwards the cock was killed and a microscopical examination showed that a living union had taken place, the blood vessels of the comb and pericementum having established free communications.

I also tried the experiment upon a cock's comb, to further and personally assure myself of the truth of this statement, and confirmed, as far as attachment was concerned, the experiment of the great surgeon. But, in my experiment, I took the precaution of removing the pulp and filling the pulp chamber and root canal with a preparation of gutta percha, known as "Hill's stopping," much used by dentists for temporary fillings. This was in order to avoid any trouble from a decomposing pulp. The tooth was then well cleansed with warm water and dipped in a disinfecting solution. The success of this experiment satisfied me that the pericementum would attach itself to any vascular body, and that, if properly planted in a fresh socket, it would attach itself and form a living union with the surrounding tissues, without the production of afterpains or other evil consequences.

My first experiment January 24th, 1881, was on a Mrs. H., a lady of about 36, who had nursed a badly diseased root of a left superior lateral incisor for fifteen years, in order to maintain the contour of the gum, while wearing a plate with an artificial

crown resting on it. Whilst waiting for a lateral, I cured the diseased root, but kept its shattered parts together, in order to preserve the socket intact. There had been so much disease in this socket that the gum was covered with cicatrices, the sequellæ of different discharges. At last I procured the tooth needed from a lady of about forty, and prepared it in the manner already described for the cock's comb. Before doing so, I extracted the root, in order to allow the patulous vessels to close of their own accord. When the tooth was ready, I carefully wiped out the clots, rinsed the socket with a disinfecting solution and put in the tooth. Finding the root a little too long, I cut off the excessive portion of the apex, cleansed the socket again, pressed the tooth into position and held it in place by delicate silk ligatures. No pain ensued, no swelling, and no unpleasant symptoms, of any kind whatever, developed. Four days after, the ligatures were removed and I was gratified to find the tooth well attached and resisting gentle traction made with the fingers. The ligatures were again replaced, in order to hold the tooth firmly in position until the attachments had acquired sufficient strength. In four weeks they were removed. The tooth has now been in its new home, nearly five years and is as firm in its place, and light in color, as any tooth in the delighted lady's mouth.

I have now had between thirty and forty cases of transplantation into sockets already formed, and have to report but two failures. One due to the patient's own neglect, in leaving for foreign parts too soon after the operation, and not allowing me to place the ligatures necessary to retain the tooth in a fixed position, until sufficiently strong attachments could take place, and the other, to my own inexperience. In the latter case, there was a diseased root of fourteen years standing. The attachments all around the root had been destroyed and the tooth

hung but by a pedicle at the apex. I had not had time to cure the root, and so I drilled through the crown of the new tooth into the pulp chamber, forming a canal through to the end, for drainage, and to treat the diseased socket. Unfortunately, I did not scrape away sufficiently the healed walls of the socket, and, therefore, attachment did not take place along the sides of the root. The tooth, not tightening, became a nuisance to the lady, who was of a highly nervous temperament, and three months after its insertion it was removed.

One case, where I had but little hope of success, turned out a decided one. At the time, I was surprised, but since I have discovered the wonderful grip a little pericementum has, I am no longer surprised at anything this remarkable membrane will do. As there was a little sentiment, besides cold science, connected with this case, I take a special pleasure in narrating it. Two young girls of sixteen, merry, laughing, loving little friends, came to me, one had an upper bicuspid that was overcrowding her otherwise lovely mouth; the other a badly formed, worse decayed and painful lower one in hers, and they asked me if I would not please take the one out and insert the other in its place. But as the root of the upper was considerably wider than the lower, and would necessitate, to fit the tooth properly, the reduction of the diameter of the root, and thereby involve the destruction of considerable pericementum, I did not consider it practicable. Nevertheless, as they seemed to have set their hearts upon it, evidently believing that this transfer of tooth, would, in some subtle manner, unite them more closely, and the one declaring her willingness to suffer any pain, even with the slight chance of success promised, to have her wish consummated, I yielded. In this operation I had to grind away the labio-lingual aspects of the root, thus denuding the whole of these surfaces of pericementum, and leaving but two strips of this mem-

brane, one anteriorly, and the other posteriorly, with which to form attachments. Nevertheless, it did so, and it is now one of the best and firmest teeth the young lady has in her head. This operation was performed Feb. 21st, 1881, but a month later than the one previously reported.

The great and only difficulty I had to contend with, was the procurement of teeth at the time they were needed. At last a way suggested itself. I applied to my dental friends for whatever good teeth or roots the exigencies of cases required them to extract. The experiment of Hunter and my own experience had taught me that teeth could be kept alive, indefinitely, in cocks' combs. But could they be transferred to the human mouth again and made to grow there? I concluded they could, and my first experiment verified my conclusion.

On November 28th, 1882, a bicuspid that had been in a cock's comb for ten days, was transferred to the mouth of a gentleman, where it fastened itself, as if there had been no gallinaceous period in its existence.

Where I have not been able to procure a suitable tooth, I have taken a root, and mounted an artificial crown on it. Sometimes I use the natural crown of a tooth that has been irretrievably loosened by incrustation of tartar on its root. In this case I simply saw off the bad root and attach a good one to the crown by means of one or more gold screws and cement. In these cases the patient simply changes roots. I have also discovered that the pericementum can be kept alive for, certainly, two days, in warm water, temperature 100° to 110° Fahrenheit. I have in two cases transplanted teeth successfully that had been so kept for fifty hours.

My former practice when I found a root was too long or too wide for a socket, was to cut off from the apical extremity, or shave off from the surface of the root, the necessary quantity to

insure a fit: but so often the best portion of the pericementum was in that way removed, that I tried deepening or widening the cavity as the case required, often cutting freely into the bone in order to save all possible of this valuable tissue. I found that adhesion took place in this portion as perfectly as in the unbroached. The consideration of this, led me to the grand conclusion, that *artificial sockets could be drilled into the bone itself and teeth planted therein as successfully as into the natural cavities.*

My first operation of this nature was reported to the California State Dental Association in August last, and its success was witnessed by them seven weeks after its performance. But as the transactions of this society for this year, will not be published for some time, I will incorporate that report in this article.

REPORT.

On the 17th of June last, Miss Ward, a young lady of 24, presented herself. She had lost the left superior lateral incisor, root and all, four years previously, and had been wearing, as a substitute, an artificial tooth on a rubber plate. The collapse of the gum, consequent on the absorption of the alveolus, was so great, and the exposure of gum so much, in conversation, and especially in smiling, that the falsity of the denture was immediately recognized, and was an object of great distress to her. As it was impossible, for the reasons just given, to produce an artificial substitute that would look natural, I determined upon the following operation,—one that I had for a long time contemplated, and which, though satisfied in my mind, in consequence of certain observations and experiments, would be successful, seemed so opposed to scientific thought and the established rules of surgery, that I had not before screwed up my courage sufficiently to attempt it. I took a corresponding lateral from a young man, which, from its awkward position, was disfiguring

his mouth, and prepared it as I do all teeth I use in transplantation, viz.: removed the pulp, filled the pulp chamber and root canal with Hill's stopping, and finished the apex with gold. The tooth was then placed in water of the temperature 100° to 110° Fahrenheit, to cleanse it of all blood and impurities, and allowed to remain for about one hour. It was then placed in a bath of bi-chloride of mercury, 2 parts to 1,000 water, for about fifteen minutes, to disinfect it. The tooth being now ready, I turned my attention to the patient. I cut a hole in the gum a little less than the diameter of the root to be inserted. I then took an ordinary flat, angular-edged drill, and drilled into the bone in the line of direction the tooth was to occupy. When fully deep enough, I widened the cavity and formed the socket with a cone-shaped burr. When I found by trial that the cavity would receive the tooth perfectly, I carefully washed and sponged it out, in order to remove every particle of detached bone, first with warm water, then with cold, and lastly with the bi-chloride solution already referred to, and when the bleeding had ceased, I introduced the tooth, and kept it in position by delicate silk ligatures attached to the central incisor on the right and to the canine on the left. There resulted a little swelling over the root, which remained a few days and then gradually disappeared.

An accident to the gum occurred during the development of its socket. Just as the drill touched the surface of the bone the young lady jerked her head back, which caused the instrument to slip forward and through the gum, making a triangular shaped gash of fully an eighth of an inch in length. Before the tooth was inserted the edge of this cut was brought carefully together and retained in contact by delicate silk sutures. On the fourth day the sutures were removed and no mark was apparent to tell of the lesion that had existed. In twelve days I removed the ligatures from the tooth and found it well at-

tached. I then removed the threads to fix the tooth while the callus formed round the root. About three weeks afterwards, the gum being free from every sign of irritation and the tooth comparatively firm, and desiring to improve the position of the right superior central and lateral, I had to pass the ligatures around the new tooth. This, unfortunately, set up a slight inflammatory action, and an epulis formed a few days after, and a little discharge of matter took place. I thereupon removed the ligatures and treated with injections of iodine. When last seen the epulis had nearly disappeared, the surrounding gum had resumed its normal look, the tooth become firm in its position and performing its functions in common with its fellow teeth as though it had never been a stranger in the mouth.

This case was examined by several physicians, and by the members of the California State Dental Association, who, with the exception of two, pronounced the operation a great success. These two gentlemen were not thoroughly satisfied with its stability because, only, of the epulis that had formed.

CASE TWO.

On the 15th of August and the 5th of September, similar operations were performed on Mrs. C., æt. 35. In Mrs. C.'s case, however, the teeth (superior bicuspids) had been absent for twenty years, and during this time she had worn an artificial plate.

On the first date mentioned, a socket was drilled out immediately on the right of the right superior canine, and a bicuspid inserted. It was held in position by a silk thread attached to the canine and lateral in front, and a molar a little distance in the rear, the thread simply passing over the crown between the cusps like a tight-rope.

On the 5th of September, Mrs. C., being satisfied of the success

of the operation, had two bicuspids inserted in the left side in a similar manner. In this case, however, there was no molar to attach a thread to and so a little loose, diseased root of a second molar had to be brought in requisition. Into this root a fine gold wire was inserted to which the distal end of the string was attached, the string brought taut over the crowns and between the cusps and fastened to the canine and lateral in front. After the insertion of these teeth the face swelled slightly, but there was no tendency to expel the teeth, nor was there any pain connected with them. The face was washed with the ordinary solution of muriate of ammonia in water and alcohol, and the gum painted with iodine. In four days the swelling subsided. The gums have now been for over two months without the slightest mark of irritation. The teeth have become quite firm, and the lady is now using them in mastication, There are three more teeth yet to be inserted,—one right bicuspid and two left superior molars,—which will be done as soon as the proper teeth are procured.

Among the many medical and dental gentlemen who have critically examined this case, and expressed themselves fully satisfied with the success and utility of this operation, are:

Prof. R. Beverly Cole, A. M., M. D., M. R. C. S., Medical Department, University of California.

Prof. F. H. Terrill, M. D., Medical Department, University of California.

Wm. S. Whitwell, A. M., M. D., Editor *Pacific Medical and Surgical Journal.*

Wm. T. Garwood, M. D., former Resident Physician City and County Hospital.

A. F. Sawyer, A. M., M. D.

C. M. Richter, M. D., late Chief Surgeon of the German Hospital.

J. A. W. Lundborg, President California State Dental Association.

S. E. Knowles, M. D., D. D. S., President San Francisco Dental Association.

Wm. A. Knowles, M. D., D. D. S., Vice-President California State Dental Association.

Alex. Warner, D. D. S., late President California State Dental Association.

So perfectly natural is the appearance of these teeth in the mouth, so firm and so normal the surrounding gum, that the great majority of these, as well as of other gentlemen who have seen the case, were unable, when put to the test, to distinguish the transplanted teeth from those that were " native and to the manor born." Many mistook some of the old teeth for the new, and the three or four who did point out the right teeth acknowledged that they merely guessed them, in consequence of their being handsomer and better than the other teeth.

Mrs. C. herself says: "When I think that for twenty long years I have had to wear a nasty, old plate, and now I have instead natural teeth growing in my mouth, I feel so happy that I cannot express myself."

Practical experiments have convinced me that the views expressed, of the formation of the socket, and method of attachment of the teeth, in the books on this subject, are erroneous, and in a subsequent paper, I hope to discuss the method of attachment of the teeth in artificial, as well as natural sockets, and to prove theoretically, as well as I have practically, that they may be transplanted and made to grow in the former, as well as the latter, and be as perfect in appearance and utility as if they were the development of the very jaw itself, and that this can be a rule and not an exception.

ADDENDA.

On the 3d of December, 1885, a right superior central that had been extracted from a young lady by a professional friend, was inserted into an artificial socket formed in the mouth of Mr. James J. Molony, a gentleman of 34, who had lost a corresponding tooth 13 years previously. This tooth had been fifty hours out of its original owner's mouth before transplantation. So perfect is the appearance of this tooth and the surrounding gum, and so firmly has it become fixed, that prominent physicians and dentists, to whom Mr. Molony, in his enthusiasm, showed the tooth, disputed his word, and one of our oldest practitioners, Dr. H. H. Thrall, had to come to me in person, to satisfy himself as to the truth of this gentleman's statement.

On the 8th of December just past, a right lower wisdom tooth that had been extracted, to relieve an overcrowded maxilla, was planted in the left superior jaw of a Mrs. E., aged 45. This lady had lost all the teeth on one side of that jaw, with the exception of the second bicuspid, through phagedenic pericementitis, and had but one molar left in the lower. This tooth was planted directly over that molar, and its articulation with it is perfect. It was held in position for three weeks, by a silver band attached to a clasp fitted to the bicuspid already mentioned that extended to and nearly surrounded the transplanted molar. The band was removed and the tooth found so well attached, that no farther support was deemed necessary.

This tooth was inserted, with a good many misgivings as to its success; for, in the first place, the negligence of my assistant allowed the temperature of the water, in which the tooth was kept immersed over night, to run up to 150° F., and it must have suffered that heat, for at least ten or fifteen minutes before discovery. In the second place, the absorption of alveolus had become

so great, that when the tooth was placed in situ, only two-thirds of the roots were imbedded in the gum and bone. Nevertheless, the tooth is becoming firmer every day, and promises in a month or two, to do as good service as ever its predecessor did. The part into which this tooth was inserted had been edentulous for two years.

On December 15th, the fourth bicuspid was planted in Mrs. C.'s mouth, which completes all the operations of this, kind required on the right upper jaw. Next month we propose, D. V., to plant a molar on the left side and immediately in the rear of the bicuspids, inserted on the 5th of last September.

This, it will be remembered, is the fourth tooth that has been planted in this lady's mouth. The retaining ligature was removed on the second of this month (January), and the tooth found unusually firm. It has been, since that time, without any other support than the living one derived from its environment.

I have now transplanted into artificial sockets, seven teeth; four into one mouth and one each into three others. They have been one central incisor, one lateral incisor, four bicuspids and one molar. Sufficient variety to show, that a whole sett may be thus planted into an edentulous jaw, even after the teeth have been absent for twenty or more years. I have as yet had no failures, and with proper care and under proper conditions, I have no fear of any.

Science has been startled at the success of this operation, from what I believe to be a misconception of the relation of the tooth, to the alveolar socket, through the pericementum or peridental membrane. Some believing this membrane to be a single tissue, having two creative sides, one producing the cementum and the other, the alveolar socket; others, that it is a double or reflex membrane, one being a true periosteum and producing the bony environment surrounding the tooth, and the other, a

modified tissue generating cementum, a substance which being analogous to bone is yet not true bone.

I am convinced that the alveolar socket has no periosteum, and that only one side of this single or double membrane, has a callus generative energy, and that is, its dental aspect; the other, has simply the power of forming attachment.

True periosteum will revive its function of producing bone, after its first osseous creation has been removed, and if the outer layer or side of the peridental membrane was such, it would also produce callus, upon the loss of its osseous structure. But in treating irregularities of the teeth, where a malposed tooth has to be moved, sometimes a quarter of an inch, we find the deposition taking place, from the alveolar surface only and continuing from there, until the tooth is reached. Also in the experiment on the cock's comb, it simply forms attachments with the surrounding vascular substance, without producing the petrous crust, which it would do, had it the function of periosteum. Besides, if the development of a tooth is followed, it will be seen, that no periosteum is employed, in the formation of the socket. It is the pressure of the crown, due to the force of growth in the developing tooth, that produces the absorption of bone, necessary for its eruption. While the crown is in the alveolar process, there is no attachment to it, and there is certainly, no periosteum lining the alveolar wall. When the crown has passed through into the mouth and the root or roots of the tooth have taken its place, in the space formed in the alveolus, its wall is still as minus a periosteum, as when the unsympathetic crown, forced its way through. Now, the crown of the tooth, is considerably larger than the body and roots, and makes a larger space in its progress, than is required by its continuation. Therefore, when the crown has escaped from its osseous imprisonment, there is a space left between the

tooth and the alveolar wall. This enables the tooth, to assume its required elevation in the mouth, before the deposition of bone, fills up the space and firm attachments take place.

I think I have shown, that the investing membrane of the tooth produces callus only on its dental aspect; that the socket, being formed by the crown, no periosteum is present or engaged in its formation; therefore, this filling up of the space with osseous matter, and attachment to the pericementum must come, and is only possible, from the *endosteum*. This delicate membrane, lining the cells and interstices of the bony structure, is but a continuation of the periosteum, surrounding the maxillary bone and alveolar process, and has, as is well known, all the powers of its mother tissue. In moving a tooth from a wrong position into a right one, the space left, is filled up and attachment renewed by this endosteum. When a tooth is extracted, it is due to the endosteum that the space is filled. When a lesion occurs in the jaw or other bones, at points remote from periosteum, it is to this very membrane that reparation is due. Therefore, when a socket is artificially formed, and a tooth is planted therein, it must be evident, that it is the endosteum of the osseous surrounding, that performs the task of union, and that it will do so, as naturally with a strange tooth, as with the organ developed in its own structure; for, to the endosteum, it makes no difference, if the lesion in its structure is caused by a developing tooth or by an instrument. It is, in either case, a lesion, and only the variation in a subjective, from an objective cause.

I am about to commence a series of operations on rabbits and other animals, to test the assertions I have made, regarding the reparation of bone and attachment of a tooth thereto, by drilling into some portion of their osseous structure, and planting roots into the cavities thus formed. At different times, the animals

will be killed and microscopical examinations made. In this way, I hope to place beyond doubt, the method of attachment of a tooth to a bony surface. I shall publish the result of these experiments, trusting that it will lead the professional mind, everywhere, to a kind consideration and endorsement of this operation, and thus assist, in doing away with the necessity for false teeth, and so, add immeasurably, to the comfort, beauty and health, of the human mouth.

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